Ralf Joost

Dr.-Ing. Ralf Joost

Current Research

The design and the behavior of physically unclonable functions (PUF) are my current research topics. In order to get as much information as possible, I'm looking for a way to test different designs on as much FPGAs as possible. For the moment, I provide a first simple test design for download. You will find three files: the FPGA hardware configuration file (PUF256.sof), the according software file for the embedded NIOSII soft-core processor (PUF256.elf) and a basic guide ReadMe.pdf.

The design is made for the DE2-115 development board, it does not run on other systems! I only provide the synthesized version of the design rather than the source files to ensure that all tests are done with the very same bit file. Beside the synthesis tool chain from Altera, no other software on the host PC is required. There is only text data transferred to the host, employing the FPGA's JTAG uart module.

The ReadMe file provides all information necessary for setting up the design and running the test. For more information about the design itself, refer to the list of publications and look out for my papers dealing with PUFs. Currently, two papers are in the review process and thus not available in the list of publications yet.

Forschungsgebiete

- Hardware-Entwicklung
- FPGAs
- Eingebettete Systeme
- Software-Entwicklung

Lehrveranstaltungen

- Einführung in die Praktische Informatik
- Programming Mobile Robots (3. Sem M.Sc. CE)
- Soft Computing Methods (2. Sem M.Sc. CE)

Publikationen

Ralf Joost, Daniel Ziese, Alexander Hawlitschka, Ralf Salomon:
Mouse-Pi: A Platform for Monitoring In-Situ Experiments
Tagungsband des 5. Jahreskolloquiums Bildverarbeitung in der Automation (BVAu 2016), pp. 1-5, ISBN: 978-3-9814062-7-6, Lemgo, Deutschland, Dezember 2016

Ralf Joost, Ralf Salomon:
Vorrichtung umfassend logische Elemente
Offenlegungsschrift DE 10 2015 103 640 A1, Rostock, Deutschland, September 2016

Ralf Salomon, Ralf Joost:
PCDA – A Massively Parallel, Scalable, Precise, FPGA-based Coincidence Detector Array
In Proceedings of the 12th IEEE International Conference on Control & Automation (IEEE ICCA 2016), pp. 679-684, ISBN: 978-1-5090-1737-9, Kathmandu, Nepal, Juni 2016

Ralf Joost, Ralf Salomon:
CDL, a Precise, Low-Cost Coincidence Detector Latch
Electronics, Vol. 4, No. 4, pp. 1018-1032, MDPI AG, Basel, Switzerland, Dezember 2015

Ralf Joost, Matthias Hinkfoth:
Combining BOUNCE and X-ORCA: Improving their real-world utility
Microprocessors and Microsystems 39 (2015) pp. 648-655, Elsevier B. V., Amsterdam, Niederlande, August 2015

Ralf Salomon, Ralf Joost, Matthias Hinkfoth:
Platform-Independent Gigabit Communication for Low-Cost FPGAs
23nd ACM/SIGDA International Symposium on Field-Programmable Gate Arrays (FPGA 2015), pp. 265-265, DOI: 10.1145/2684746.2689150, ISBN: 978-1-4503-3315-3, Monterey, CA, USA, Februar 2015

Ralf Salomon, Ralf Joost, Matthias Hinkfoth:
Verfahren und System zur Übertragung von Daten
Patentschrift DE 10 2014 201 807 B3, Rostock, Deutschland, Februar 2015

Salomon, R.; Lüder, M.; Heinrich, E.; Joost, R.
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Hinkfoth, M.; Joost, R.; Salomon, R.
Exploring Duty Cycle Distortions along Signal Paths in FPGAs
22nd ACM/SIGDA International Symposium on Field-Programmable Gate Arrays (FPGA 2014), ISBN: 978-1-4503-2671-1, p. 257, Monterey, USA, Februar 2014

Joost, R.; Hinkfoth, M.; Salomon, R.
Improving Calibration Precision of Signal-Delay-Based Time Measurement Systems in FPGAs
2013 International Conference on ReConFigurable Computing and FPGAs, ISBN: 978-1-4799-2078-5, Cancun, Mexico, Dezember 2013

Joost, R.; Salomon, R.
Time Coding Output Neurons in Digital Artificial Neural Networks
2012 IEEE International Joint Conference on Neural Networks, ISBN: on USB, ID: E-564, Brisbane, Australia, Juni 2012

Salomon, R.; Heinrich, E.; Joost, R.
Modeling the Nucleus Laminaris of the Barn Owl: Achieving 20 ps resolution on a 85MHz-Clocked Digital Device
Frontiers in Computational Neuroscience, pp. 1-9, ISSN: 1662-5188, Lausanne, Schweiz, Februar 2012

Heinrich, E.; Joost, R.; Salomon, R.
A Digital Implementation of the Nucleus Laminaris
The 2011 International Joint Conference on Neural Networks (IJCNN 2011), pp. 1461-1465, ISBN: 978-1-4244-9636-5, San José, USA, Juli 2011

Heinrich, E.; Joost, R.; Salomon, R.
Learning from the Barn Owl Auditory System: A Bio-Inspired Localization Hardware Architecture
IEEE Congress on Evolutionary Computation, pp. 216 - 221, ISBN: 978-1-4244-7834-7, New Orleans, USA, Juni 2011

Heinrich, E.; Lüder, M.; Joost, R.; Salomon, R.
X-ORCA - A Biologically Inspired Low-Cost Localization System
10th International Conference on Adaptive and Natural Computing Algorithms, Part II, pp. 373-382, ISBN: 978-3-642-20281-0, Ljubljana, Slovenien, April 2011

Heinrich, E.; Joost, R.; Lüder, M.; Salomon, R.
Precise Indoor Localization with Low-Cost Field-Programmable Gate Arrays
IEEE Symposium Series on Computational Intelligence (SSCI 2011), pp. 23 - 28, ISBN: 978-1-4244-9911-3, Paris, Frankreich, April 2011

Lüder, M.; Warmuth, R.; Heinrich, E.; Joost, R.; Salomon, R.
SRD - Towards a System for the In-Situ Detection of the Stapedius Reflex
IEEE Symposium Series on Computational Intelligence (SSCI 2011), pp. 29 - 34, ISBN: 978-1-4244-9910-6, Paris, Frankreich, April 2011

Salomon, R.; Joost, R.; Schwelgengräber, W.
The Model Railroad as an Inspiring Platform for Microelectronics Education
8th European Workshop on Microelectronics Education, pp. 98-101, Darmstadt, Deutschland, Mai 2010

Schwelgengräber, W.; Salomon, R.; Joost, R.
The Model Railroad as an Example Avoiding Tacit Knowledge in Microelectronics Studies
2nd International Conference on Computer Supported Education (CSEDU 2010), pp. 246 - 251, ISBN: 978-989-674-024-5, Valencia, Spanien, April 2010

Heinrich, E.; Lüder, M.; Joost, R.; Salomon, R.
FPGA-based Implementation Alternatives for Keyed-Hash Message Authentication Code in Networked Embedded Systems
IEEE 14th International Conference on Emerging Technologies and Factory Automation (ETFA 2009), ISBN: 978-1-4244-2728-4, La Palma, Spanien, September 2009

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BOUNCE: A new High-Resolution Time-Interval Measurement Architecture
IEEE Embedded Systems Letters (ESL), Vol. 1, No. 2, pp. 56-59 , , USA, August 2009

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BOUNCE, a Concept to Measure Picosecond Time Intervals with Standard Hardware
13th IEEE International Conference on Emerging Technologies and Factory Automation (ETFA2008), pp. 1010-1015, ISBN: 1-4244-1506-3, Hamburg, Deutschland, September 2008

Joost, R.; Salomon, R.
BOUNCE, a new Approach to Measure Sub-Nanosecond Time Intervals
International Conference on Field Programmable Logic and Applications (FPL 2008), pp. 511-514, ISBN: 978-1-4244-1961-6, Heidelberg, Deutschland, September 2008

Heinrich, E.; Staamann, S.; Joost, R.; Salomon, R.
Comparison of FPGA-based Implementation Alternatives for Complex Algorithms in Networked Embedded Systems ? the Encryption Example
13th IEEE International Conference on Emerging Technologies and Factory Automation (ETFA 2008), pp. 1449-1456, ISBN: 1-4244-1506-3, Hamburg, Deutschland, September 2008

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High Quality Offset Printing ? An Evolutionary Approach
in Proceedings of the ACM Genetic and Evolutionary Computation Conference GECCO 2007, pp. 2053-2058, ISBN: 987-1-59593-697-4, London, England, Juli 2007

Joost, R.; Salomon, R.
Hardware-Software Co-Design in Practice: A Case Study in Image Processing
32nd Annual Conference of the IEEE Industrial Electronics Society (IECON 2006), S. 3674-3679, ISBN: 1-4244-0136-4, Paris, France, November 2006

Joost, R.; Golatowski, F.; Timmermann, D.
Power Saving Mechanisms in Wireless Sensor Networks (Folien)
4th International Forum Life Science Automation, Rostock, Deutschland, September 2006

Joost, R.; Golatowski, F.; Timmermann, D.
Sensor Networks in Laboratory Automation (Folien)
4th International Forum Life Science Automation, Rostock, Deutschland, September 2006

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FPGAs and Soft-Core Processors: Understanding Computer Architecture and Processing Principles
European Workshop on Microelectronics Education (EWME) 2006, pp. 79-82, ISBN: 91-7178-402-0, Stockholm, Schweden, Juni 2006

Joost, R.; Salomon, R.
Advantages of FPGA-Based Multiprocessor Systems in Industrial Applications
31st Annual Conference of the IEEE Industrial Electronics Society (IECON 2005), ISBN: 0-7803-9253-1, Raleigh, North-Carol, USA, November 2005

Abgeschlossene Forschungsprojekte (Auswahl)

- Austin - Entwicklung eines zentralen Steuerungssystem für Druckplattenbelichter (01/2005 - 05/2006)
- Celisca - Konzepte zur Ressourcenoptimierung in Sensornetzen (06/2006 - 02/2007)

Kontakt

Besucher:
Fakultät für Informatik und Elektrotechnik
Institut für Angewandte Mikroelektronik und Datentechnik
Haus 1, Raum 1207 (Sekretariat)
Richard Wagner Str. 31
18 119 Rostock-Warnemünde

Tel.: +49 381 498 7251
Fax: +49 381 498 118 7251
Email

Postanschrift:
Universität Rostock
Institut für Angewandte Mikroelektronik und Datentechnik
18051 Rostock

Schnelleinstieg

Publikationen
Anfahrt
Kontakt
Laborpraktikum
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Highlights
Projekte